

BULLETIN 924



# TESTING BULLS FOR FERTILITY



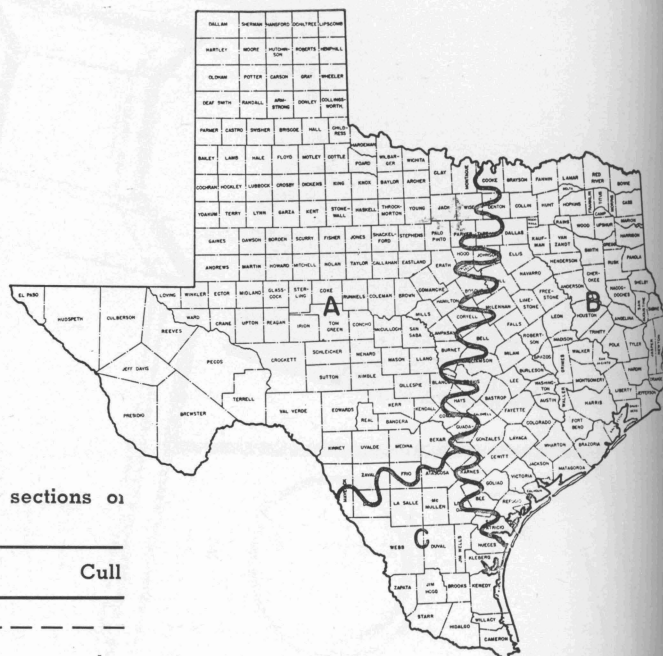


Figure 1. Map showing semen evaluation from all sections of Texas.

Area	Satisfactory	Questionable	Cull
	Percent		
A	90	6	4
B	78	18	4
C	73	15	12

#### ERRATA

Areas B and C in the above map are reversed

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# TESTING BULLS FOR FERTILITY

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How much of a problem is the infertile bull in our beef herds today? According to a recent survey, approximately seven percent of the bulls in Texas are infertile. These bulls eat just as much grass and cottonseed cake, drink just as much water and represent just as much financial investment as bulls doing a satisfactory job of settling cows. Some of them keep the fertile bull away from the cows that should be bred which results in a smaller calf crop.

For a long time producers have observed bred cows to see if they come in to heat again, or have checked calving percentages within groups of cows bred by one bull and have eliminated the bull that failed to give a satisfactory calf crop. This type of fertility testing is slow and expensive. It may mean losing an entire calf crop when a group of cows is run with only one bull during a breeding season. It also may mean that a long period elapses between the time a cow should calve and the time that she actually drops a calf.

## SURVEY CONDUCTED

Approximately 2,000 bulls were tested for fertility in a survey conducted by the Department of Animal Husbandry in cooperation with more than 100 beef cattle producers at 33 Texas locations. Information was gathered on 1,369 of these bulls. No attempt was made to select bulls of certain breeds or ages. Various sections of the State were visited when convenient and as many of the bulls were tested as possible.

Table 1 shows the rating of the 1,369 bulls as *satisfactory*, *questionable* or *cull*. *Satisfactory* indicates that the bulls should give service equal to the demands of the livestock producer for obtaining a high calving percentage. *Questionable* bulls are those that will settle some cows, but the conception rate may vary from 30 to 60 percent, thereby giving a very low calving percentage. *Cull* indicates bulls that are infertile as determined by the absence of sperm, dead sperm or possibly a few live sperm.

It is commonly assumed that the older a bull gets, the less valuable he is for reproduction. In examining this large number it was

TABLE 1. EVALUATION OF 1,369 BULLS

Rating	Number	Percent
Satisfactory	1,141	84
Questionable	136	9
Cull	92	7

found that the percentage of cull bulls did not increase with age as much as expected. Table 2 gives a breakdown of the bulls by age groups. A grouping of the older bulls, 9 through 14 years, indicated that, from a reproductive standpoint, these bulls are as good potential reproducers as the younger bulls. These older bulls may have come from herds that had previously been culled because the producer would remove a particular bull if his cows were not being settled. This method of culling may have cut down the percentage of poor bulls in the older age group.

TABLE 2. EVALUATION ACCORDING TO AGE

Years	Number	Satisfactory	Questionable	Cull
		%	%	%
1	685	82	12	6
2	276	88	6	6
3	116	80	10	10
4	109	84	6	10
5	36	81	13	6
6	48	84	8	8
7	41	73	17	10
8	40	96	4	0
9-14	18	83	11	6
Av.		84	9	7

The bulls tested were classified into five breed and strain groups, as shown in Table 3. Most of them were Herefords. Both the Hereford and Angus breeds showed a smaller percentage of *cull* bulls than the Shorthorn. Fifty Shorthorn bulls were tested; 18 percent were classified as *culls* and 14 percent as *questionable*. Of the 52 Santa Gertrudis bulls tested, 6 percent were *cull* and 31 percent *questionable*. In grouping all the bulls with some Brahman breeding, out of 72 bulls, 12 percent were *cull* and 27 percent *questionable*. Part of these high percentages may be due to the section of the State in which the bulls were located.

Bulls were tested in every section of Texas, however, more were tested in some sections than in others. Figure 1 shows the semen

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TABLE 3. EVALUATION ACCORDING TO BREED AND STRAIN

Number	Breed	Satisfactory	Questionable	Cull
		%	%	%
768	Hereford	87	7	6
390	Angus	89	7	4
52	S. Gertrudis	63	31	6
50	Shorthorn	68	14	18
20	Brahman, Brangus, Beefmaster & cross- bred	55	20	25
Total		84	9	7

evaluation from different sections. The highest percentage of *cull* bulls was found in East Texas and along the Gulf Coast to the Coastal Bend. This corresponds roughly with the area that receives 32 or more inches of rain annually. In the extreme southern part of the State the percentage of *cull* bulls was low, but 18 percent had *questionable* semen. In the Panhandle, West and Central Texas, 90 percent of the bulls had *satisfactory* semen and 10 percent *questionable* or *cull*. Whether differences in fertility are caused by climatic conditions, or whether the bulls themselves actually have a lower fertility potential in the eastern and Gulf Coast regions is questionable. Grasses and feedstuffs produced in the eastern and extreme southern parts of Texas are considered inferior to those produced in the central and western parts. A true explanation of the difference in fertility is unknown.

Bulls were tested during 9 of the 12 months, as shown in Table 4. This table also shows the number of bulls tested each month and their fertility ratings. No definite change in the fertility pattern is evident as a result of climatic conditions. Most livestock producers believe that their bulls have lowest fertility during the late summer, but this seasonal difference is not shown by the survey. However, there is a trend toward lower fertility in late summer if the *questionable* bulls are included with the *cull* bulls.

TABLE 4. EVALUATION ACCORDING TO TIME OF TEST

Month	Number	Satisfactory	Questionable	Cull
		%	%	%
Jan.	136	87	5	8
Feb.	83	77	15	8
Mar.	239	92	4	4
Apr.	..	..	..	..
May	37	70	8	22
June	..	..	..	..
July	..	..	..	..
Aug.	10	60	40	0
Sept.	149	59	25	16
Oct.	376	86	9	5
Nov.	53	49	36	15
Dec.	286	93	4	3
Av.		84	9	7

## HOW SEMEN IS COLLECTED

Semen has been collected for evaluation and artificial insemination for many years, but the methods used have been impractical for range bulls. The electro-ejaculator has overcome many of the difficulties experienced with the other methods of collection. If a bull is restrained properly in a good chute, semen may be collected with this machine, regardless of the bull's disposition. If a ranchman works his bulls routinely through a chute once a year, the semen sample can be collected at that time and little additional handling will be required. Bulls on small farms can be hauled to one central location where there are proper pens and chutes for testing. Collecting and evaluating semen requires only 6 to 10 minutes per bull.

The electro-ejaculator was developed to produce an electrical impulse to stimulate the nervous system supplying the reproductive tract, causing erection and ejaculation. Low-power stimulations given intermittently should be used to initiate response. The power should be increased gradually to obtain extension and erection prior to ejaculation. The first fluid that passes is a clear, watery secretion from the accessory glands which contains few if any sperm cells. Following this, the ejaculate turns into a milky fluid consisting of sperm and accessory fluids. A collection is made at this time for evaluation. The collection is made in a test tube attached to a flexible plastic funnel which reduces breakage and injury. The reproductive organs should be examined for abnormalities at the time of testing.

## A REPEAT TEST

If a bull is found to be in the *questionable* or *cull* group, a repeat test should be made while he is still in the chute. Even a third and fourth ejaculate may be necessary in a few instances when the operator is not sure that he has obtained a representative sample from a particular bull. A few minutes should be allowed for the bull to regain his composure before restimulation occurs.

## HOW SEMEN IS EVALUATED

The semen sample is examined with the naked eye and under a microscope to determine four characteristics—density, motility, rate of movement and morphology.

### Density

The first characteristic observed is the color. Samples more concentrated with sperm will be milky to creamy white. Samples that range in color from slightly milky to a clear, watery secretion contain fewer sperm cells.



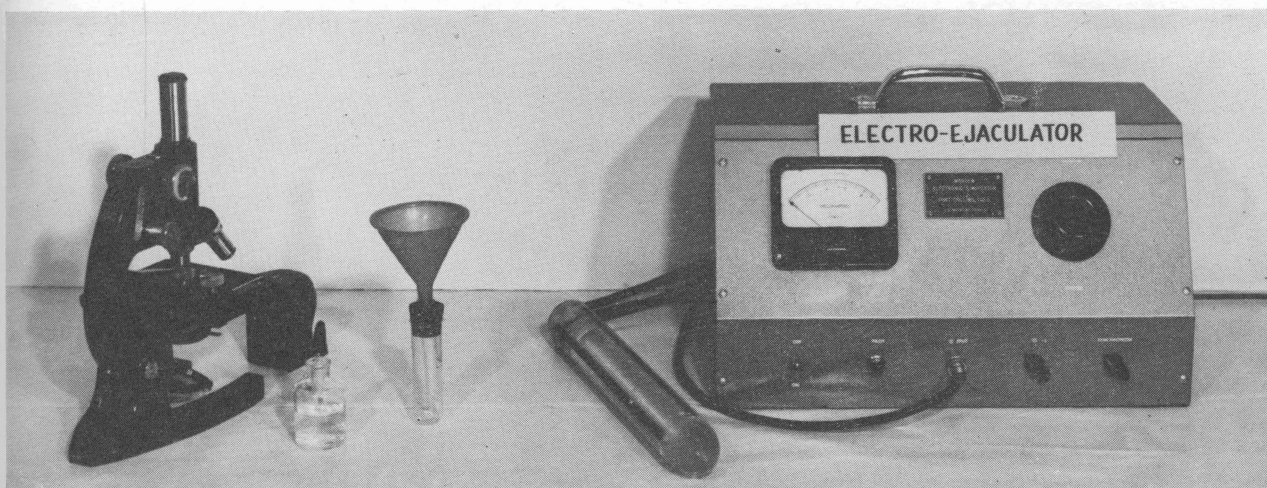


Figure 2. Essential equipment for collecting and evaluating semen.

### Motility

The semen sample is examined next under a microscope for motility or the percentage of moving cells. Semen samples usually will have 50 to 70 percent motility, or that percentage of moving cells. Bear in mind that dead cells may be bumped by moving live cells and cause an apparently higher percentage of motility than actually exists.

### Rate of Movement

Rate of movement is the third characteristic. Rapid forward movement is desirable.

### Morphology

The fourth characteristic is morphology, or the appearance of abnormal sperm. Normal sperm are much like a tadpole with a long tail, as shown in Figure 4. Many types of abnormalities may appear, including coiled or crooked tails, tailless, broken necks and small, large or double heads. Some of these are shown in Figure 5.

## GRADES OF SEMEN

Semen samples usually are graded as *satisfactory*, *questionable* or *cull*.

### Satisfactory

A *satisfactory* semen sample should have good density as indicated by an opaque, milky white ejaculate. Microscopic examination should show that the milky appearance is caused by sperm cells and not by foreign material such as leucocytes due to infection. More than 50 percent of the sperm cells should be moving. Generally, a good sample will have 50 to 70 percent rapidly moving cells. Close observation is needed to determine abnormalities, which should be less than 15 percent.

### Questionable

*Questionable* semen has a single or combination of low values for density, motility, rate of movement or morphology. These may include fair density, as denoted by a translucent

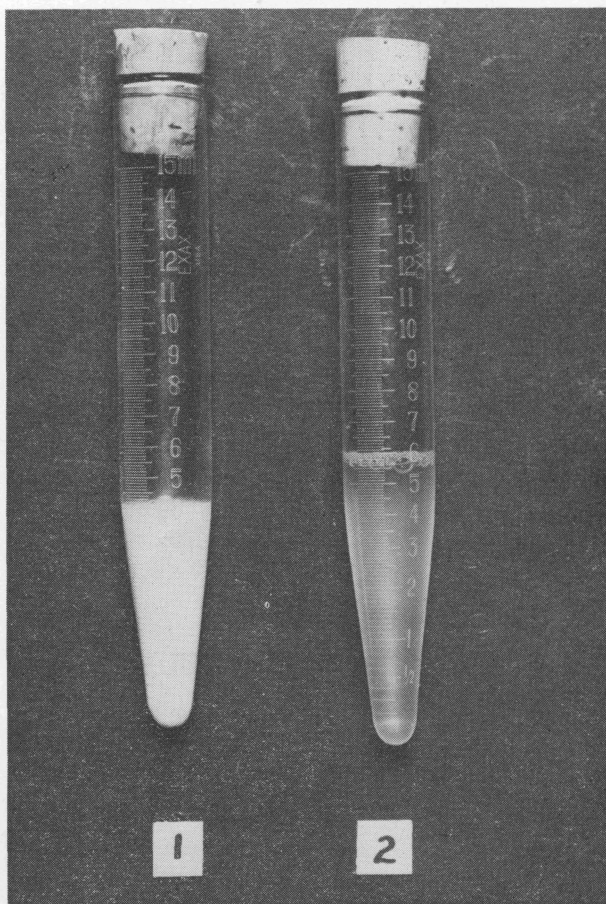


Figure 3. Sample No. 1, creamy white in color, indicating good density; sample No. 2, watery and contains only a few sperm cells.

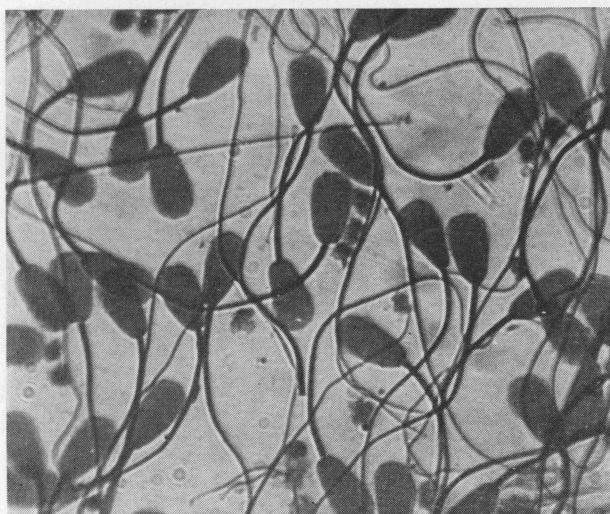


Figure 4. A microscopic picture of good-quality sperm cells.

or slightly milky ejaculate, motility of 30 to 50 percent, medium rate of movement and abnormalities above 25 percent. If the sample is within the ranges given in any of the four criteria, it should be graded *questionable*.

### Cull

A clear, watery sample indicates *cull* semen. Such a sample will show few, if any, sperm cells under the microscope. The sample is *cull* if all of the sperm cells are dead, or if they show only a slight rate of movement. Abnormalities alone usually are not enough to cause a sample to be graded *cull*.

## REPRESENTATIVE SEMEN SAMPLE

A representative sample of semen must be collected for proper evaluation. Occasionally a bull will not respond to the electro-ejaculator satisfactorily and may produce better semen than the test indicates. Where rechecks were made 1 month later, only one out of every 30 bulls classed as *questionable* or *cull* improved enough that the semen could be classed as *satisfactory*.

## CHECKING YOUNG BULLS

Evaluating the semen of young bulls should be encouraged, but certain facts should be considered. Semen production begins with sexual maturity and all bulls do not reach maturity at the same age. Most bulls of European breeds show viable semen as early as 14 months of age. Semen evaluation in bulls of other breeds usually is not recommended until around 18 months of age. Semen samples from young bulls will have less volume and lower density than from older bulls.

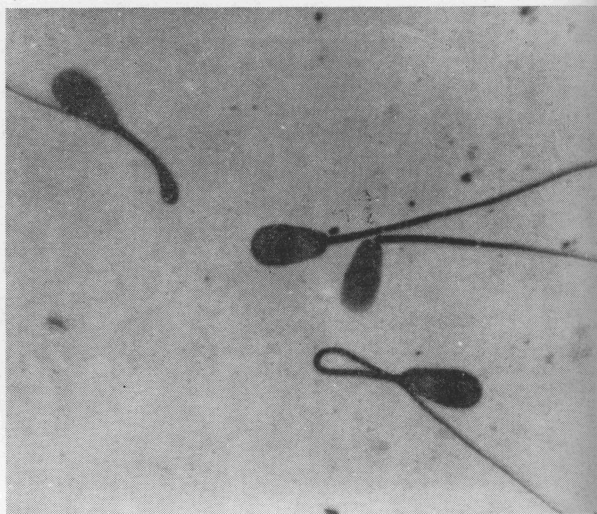


Figure 5. A microscopic picture of sperm with numerous deformed cells.

## USING THE RESULTS OF TESTS

### Satisfactory

A bull that produces *satisfactory* semen and is able to mate properly, is capable of settling most of the cows to which he is bred.

### Questionable

Bulls showing *questionable* semen are not sterile, but will settle about one-fourth to one-half of the cows to which they are bred. Such bulls should be culled or retested after 30 days. Only under extreme circumstances where an expensive bull is involved or replacements cannot be obtained, should *questionable* bulls be kept. In most instances, these bulls should be removed from the breeding herd. In some cases, veterinarians can determine the cause of low fertility in bulls and treat them successfully. Cost, time and the response to treatment will vary with the cause of low fertility.

### Cull

Bulls classified as *culls* may occasionally cause a cow to conceive. But when the semen contains no sperm or all the sperm are dead, the bull cannot cause a cow to conceive. Bulls that produce *cull* semen should be disposed of or treatment started as soon as possible.

## WHEN TO CHECK FOR FERTILITY

Three periods during the year, depending on the ranchman's situation, are the most practical for checking bulls for fertility.

### Just Before the Breeding Season

The best time to find out about the fertility of bulls is just before the breeding season



starts. By testing at this time, ranchmen can identify sterile or near-sterile bulls at the time they are expected to settle cows. A small percentage of the sterile or near-sterile bulls, as well as those with low-quality semen, may recover; but since this takes 3 to 6 months, they are of little value during the current breeding season.

The main disadvantage in checking at this time is that the ranchman has little time to buy replacement bulls and those available probably have been picked over.

### **Soon After the Breeding Season**

Semen collected at the end of the breeding season should be evaluated carefully because heavy service temporarily lowers the semen quality in most bulls. Bulls with low-quality semen may have been the most active during the breeding season. In a few places where calf crop percentages are low and extreme weather conditions may be a factor, checking after the breeding season may be advisable. Such checks can be profitable because of the savings in feed costs if the bull is sold at that time rather than 6 to 9 months later.

### **Three to Five Months After the Breeding Season**

It may be more practical on some large ranches to identify infertile bulls about the time the calves are weaned. These bulls may be heavier at this time and sell for more money and the ranchman has a few months in which to buy replacements.

## **WHO CAN COLLECT AND EVALUATE SEMEN**

Fertility testing may be conducted by any individual trained and equipped in semen collection and evaluation.

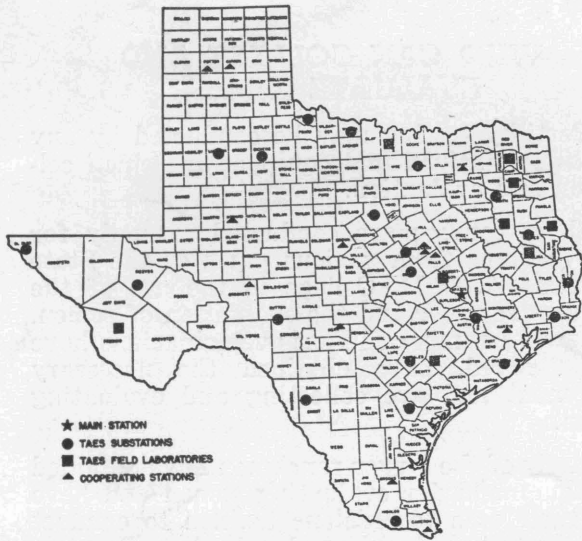
Short courses are conducted annually for veterinarians from various parts of the State at Texas A. & M. College in the use of the electro-ejaculator and the evaluation of semen. A growing number of Texas veterinarians have been trained, have obtained the necessary equipment and are collecting and evaluating semen.

Many of the larger ranchmen have obtained the equipment for evaluating semen and have had their own technicians trained to conduct fertility tests. Another plan is through a co-operative group of producers who have a trained technician test all of their bulls. In this way the cost of the equipment is shared.

## **OTHER PRACTICES TO CONSIDER**

The whole purpose of fertility testing in bulls is to produce more calves in the most profitable season, thereby increasing the return to the producer. Fertility testing of bulls is best supplemented by palpation of cows to determine pregnancy and by a disease control program, particularly those affecting reproduction. These three programs work together for the beef cattle producer. Through them, he can improve the breeding efficiency in his herd.





Location of field research units of the Texas Agricultural Experiment Station and cooperating agencies

## State-wide Research



The Texas Agricultural Experiment Station is the public agricultural research agency of the State of Texas, and is one of ten parts of the Texas A&M College System

## ORGANIZATION

IN THE MAIN STATION, with headquarters at College Station, are 16 subject-matter departments, 2 service departments, 3 regulatory services and the administrative staff. Located out in the major agricultural areas of Texas are 21 substations and 9 field laboratories. In addition, there are 14 cooperating stations owned by other agencies. Cooperating agencies include the Texas Forest Service, Game and Fish Commission of Texas, Texas Prison System, U. S. Department of Agriculture, University of Texas, Texas Technological College, Texas College of Arts and Industries and the King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

## OPERATION

THE TEXAS STATION is conducting about 400 active research projects, grouped in 25 programs, which include all phases of agriculture in Texas. Among these are:

Conservation and improvement of soil	Beef cattle
Conservation and use of water	Dairy cattle
Grasses and legumes	Sheep and goats
Grain crops	Swine
Cotton and other fiber crops	Chickens and turkeys
Vegetable crops	Animal diseases and parasites
Citrus and other subtropical fruits	Fish and game
Fruits and nuts	Farm and ranch engineering
Oil seed crops	Farm and ranch business
Ornamental plants	Marketing agricultural products
Brush and weeds	Rural home economics
Insects	Rural agricultural economics
	Plant diseases

Two additional programs are maintenance and upkeep, and central services.

*Research results are carried to Texas farmers, ranchmen and homemakers by county agents and specialists of the Texas Agricultural Extension Service*

AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENs, the WHEREs and the HOWs of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. Workers of the Main Station and the field units of the Texas Agricultural Experiment Station seek diligently to find solutions to these problems.

*Today's Research Is Tomorrow's Progress*